



April 21, 2014

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Fact Sheet

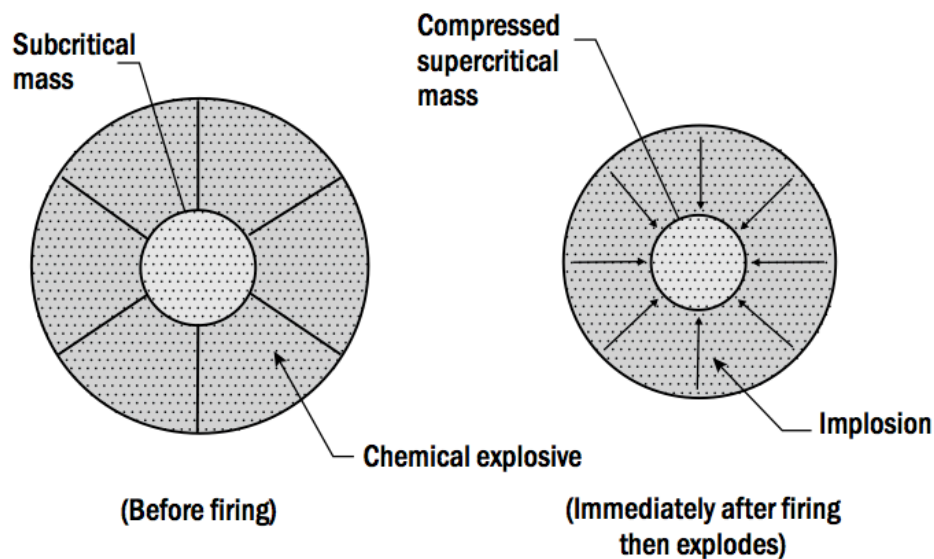
The Possible Military Dimensions of Iran's Nuclear Program

The United States and a number of other countries have provided evidence to the International Atomic Energy Agency (IAEA) that Iran secretly sought to develop the materials and technology to produce nuclear weapons over the past several decades. There is substantial evidence that Iran acquired expertise, information and technology from the nuclear black market run out of Pakistan by nuclear scientist A.Q. Khan. The IAEA is trying to determine whether this evidence is accurate and how far Iran has progressed in developing nuclear weapons. There is no evidence that Iran has or has ever built a nuclear weapon or that it has enough nuclear material to do so now. The IAEA's investigation is based on information provided by other countries and its own work. This information suggests that Iran has previously pursued development of a *nuclear implosion device*, a design similar to that used in the arsenals of most nuclear weapon states. (See figure one below.)

An implosion device – in simplistic terms – involves compressing a sphere of uranium or plutonium into a smaller but symmetrical sphere through the use of shaped explosive lenses. The concept is similar to trying to compress a soccer ball into a baseball with dynamite.

Each step in designing, testing, producing and delivering this kind of device requires highly specialized materials, equipment and expertise. Over the past decade, the IAEA has investigated the extent to which Tehran has pursued, developed and perfected many of the steps associated with the production of such a device.

Figure 1. Implosion Weapon Design Concept



Source: 2011 Nuclear Weapons Handbook, DOD

The bulk of what the IAEA has learned is referred to by the Agency as the “possible military dimension” of Iran’s nuclear program. A detailed summary of the issues being assessed by the IAEA was reported by IAEA Director General Yukia Amano to the IAEA Board of Governors in November 2011¹ and is summarized below.

The Joint Plan of Action and the IAEA

The political negotiations taking place between Iran on the one hand and the United States, Russia, China, France, the United Kingdom, Germany (known as the P-5+1) and the European Union on the other seek to negotiate a comprehensive agreement that will limit Iran’s nuclear program while enabling it to enjoy the peaceful benefits of nuclear technology. To do so, Iran must enable full and effective safeguards as implemented by the IAEA. To date, the Agency has reported that Iran is in full compliance with its obligations for special monitoring under the terms of the Joint Plan of Action (JPOA).

Iran has, however, been found in non-compliance with its safeguard agreement obligations² required under the terms of the Nuclear Nonproliferation Treaty. For over a decade, the IAEA has been seeking to clarify a number of outstanding issues related to Iran’s past nuclear activities, catalogued below. It remains unclear whether a comprehensive settlement of the remaining issues with Iran can be achieved without Iran also satisfying all of the IAEA’s outstanding concerns about its nuclear past. At the very least, states will continue to have

¹ IAEA Report, “Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran,” November 8, 2011
<http://www.iaea.org/Publications/Documents/Board/2011/gov2011-65.pdf>

² September 24, 2005 IAEA Board of Governors Resolution GOV/2005/77
<http://www.iaea.org/Publications/Documents/Board/2005/gov2005-77.pdf>

doubts about Iran's peaceful intentions as long as the IAEA is not satisfied that its investigations are complete.

The JPOA agreed to by Iran and the P-5+1 on November 24, 2013 states that a "Joint Commission of E3/EU+3 and Iran will be established to monitor the implementation of the near-term measures [under the JPOA] and address issues that may arise, with the IAEA responsible for verification of nuclear-related measures. The Joint Commission will work with the IAEA to facilitate resolution of past and present issues of concern." However, the State Department has recently clarified that the issue of past weapon-related activities is a matter for the IAEA to investigate and is not a matter for the special commission³.

IAEA and Iranian officials have continued to meet since the JPOA was completed and implemented. As yet, these discussions have not resolve the issues listed below. At some point the IAEA will likely be asked to judge whether its concerns have been addressed, and how any remaining unresolved issues might affect the IAEA's ability to carry out its inspection mandate to verify that Iran's nuclear activities are of an exclusively peaceful nature.

Possible Military Dimensions of Iran's Nuclear Program

Much of the evidence that Iran pursued a secret nuclear weapons development program comes from the United States and other IAEA member states. IAEA reports indicate that at least ten member states have provided evidence to the IAEA related to Iran's past nuclear activities. In addition, IAEA documents suggest that some of the evidence about Iran's past activities come from interviews with Pakistani sources, including possibly A.Q. Khan. None of the publicly available evidence in and of itself proves that Iran had a nuclear weapon program. It is also not clear that Iran has continued any of these activities, and it is not publicly known how far this alleged work progressed before it was reportedly stopped in 2003⁴.

Procurement Activities

The IAEA has evidence that from the 1980s until the early 2000s, Iran acquired nuclear expertise and related materials outside of normal procurement channels, including through a black market network run by A. Q. Khan. Iranian officials claim they were forced to seek nuclear items on the black market because it was blocked from pursuing "legitimate" nuclear efforts by the United States and other western powers. However, the fact that much of the procurement efforts were run by military organizations, including the Ministry of Defense, has suggests that the nuclear efforts being pursued by Iran were military in nature. Moreover, the links between procurement and other military application programs, including ballistic missile programs, undermines but does not disprove Iran's argument that its program is entirely

³ February 17, 2014 Background Briefing, Senior Administration Official, Vienna, Austria
<http://iipdigital.usembassy.gov/st/english/texttrans/2014/02/20140218293187.html#axzz2tmkRefbb>

⁴ "Iran: Nuclear Intentions and Capabilities", National Intelligence Estimate, National Intelligence Council, November 2007,
http://www.dni.gov/files/documents/Newsroom/Reports%20and%20Pubs/20071203_release.pdf

peaceful. The IAEA continues to try to understand the full nature of Iran's procurement activities.

Nuclear Material Acquisition Activities

The IAEA has evidence that during the 1990s and early 2000s, Iran pursued the development of clandestine nuclear facilities for the processing and enrichment of uranium. The Natanz and Fordow uranium enrichment sites were only declared after they were uncovered by western intelligence or outside sources. Iran also had an active program to acquire uranium outside of IAEA safeguards, for possible use in these previously clandestine facilities. The IAEA has evidence that Iran planned to secretly acquire and enrich uranium at non-declared nuclear facilities and this evidence remains under investigation by the IAEA.

Detonator Development

The IAEA has evidence that Iran pursued studies and received documentation for the development of fast-functioning devices known as "exploding bridgewire detonators." These devices have limited uses outside of detonating explosive charges associated with nuclear weapons. Iran acknowledges that it has developed EBW for civilian and conventional military applications, but has not explained to the IAEA what these applications are. As such, the IAEA continues to consider this effort a "matter of concern." Moreover, as noted below, the IAEA has information that Iran has considered the reliability of EBW in the possible testing of nuclear weapons.

Nuclear Components for an Explosive Device

Key to the IAEA's investigation is a document reportedly provided to Iran by the Pakistani black marketers related to the conversion of uranium into metallic form and the shaping of uranium metal into hemispheres. It also appears likely that Iran acquired designs for nuclear weapons, as did other customers of the Pakistani network, including Libya. The IAEA also has evidence that Iran did work preparing to produce components for such a device. This matter remains of high interest to the IAEA.

Initiation of High Explosives

IAEA member states have provided information that Iran had access to information about multipoint initiation systems. Such systems are necessary for the operation of an implosion device, such as the one Iran may have pursued. Iran has acknowledged access to the information, but claims the document was "not understandable" to their experts and has not conducted activities referred to in the information. This stance is contradicted by information provide to the IAEA by member states and appears to be related to a possible experiment carried out by Iran in 2003⁵.

⁵ Joby Warrick, "Russian scientist Vyacheslav Danilenko's aid to Iran offers peek at nuclear program" The Washington Post November 13, 2011 <http://www.washingtonpost.com/world/national-security/russian->

Hydrodynamic Experiments

Hydrodynamic experiments are full-scale model tests of nuclear implosion devices that substitute non-fissile materials to uranium or plutonium. Member states have provided information to the IAEA indicating Iran has manufactured “simulated nuclear explosive components using high density materials” – presumably to simulate uranium metal. This, together with Iran’s activities related to the use of high-speed diagnostic equipment, including flash x-ray technology, raise concerns about nuclear weapons-related work.

This area of investigation has spawned one of the most contentious⁶ areas of the IAEA’s work – that related to the facility at Parchin. The IAEA has received information from member states that Iran acquired information about, and may have built, a large explosives containment vessel in which to conduct hydrodynamic experiments. There is some evidence that Iran built and installed such a device at Parchin. Two visits to Parchin by the IAEA in 2005 failed to identify this site, but not all facilities were visited by the Agency at the time. Iran has since made large scale changes to the site, a move that could be related to concealment efforts of its past activities.

Aside from site access, Iran has yet to fully explain or effectively refute the evidence that has been made available to the IAEA on this matter and it remains of concern to the IAEA. The Agency states that it has had direct access to the source of some of this expertise for Iran, believed to be a former Soviet weapons-scientist⁷.

Neutron Initiation

Iran may, according to evidence provided to the IAEA, have undertaken work to build neutron initiators for use in nuclear weapons. In an implosion device, a small source of additional neutrons can be inserted inside the sphere to be compressed, releasing a boost of neutrons at the exact moment of implosion. This can help ensure that fission takes place and also increase the yield of a nuclear device.

Modeling and Calculations

The design of nuclear weapons can be achieved by using advanced calculations and computer-based modeling. Iran has reportedly sought access to calculation and nuclear modeling training. The IAEA has evidence that representatives from Iran “met with officials from an institute in a nuclear-weapon state to request training courses in the fields of neutron cross section calculations using computer codes.” Such models can be used in civil as well military nuclear applications. Iran has denied these allegations in writing to the IAEA.

scientist-vyacheslav-danilenkos-aid-to-iran-offers-peek-at-nuclear-program/2011/11/12/gIQAeuiCJN_story.html

⁶ <http://www.sipri.org/media/expert-comments/the-iaea-and-parchin-do-the-claims-add-up>

⁷ Ibid

Nuclear Test Planning

Iran may have made plans to test a nuclear device. There is evidence that Iran may have “conducted a number of practical tests to see whether its EBW firing equipment could function” over long distances between a firing point and a deep test shaft – commonly used in underground nuclear tests. The IAEA has also received documents from member states in Farsi discussing possible logistics associated with such a test.

Work to Modify a Missile Payload Area

The IAEA has information that Iran conducted engineering studies on how to integrate a “new spherical payload into the existing payload chamber which would be mounted in the re-entry vehicle of the Shahab-3 missile.” The Shahab-3 missile is an Iranian version of the North Korean No-Dong system with a reported range of almost 1,300 kilometers or 800 miles. The work allegedly includes the production of component prototypes as well as modeling work on at least 14 different progressive design iterations. Iran has told the IAEA it believes the information it has received are forgeries, but the IAEA has stated the “quantity of the documentation, and the scope and contents of the work covered in the documentation, are sufficiently comprehensive and complex that in the Agency’s view, it is not likely to have been the result of forgery or fabrication.”

Fusing, Arming and Firing

The alleged studies and documents noted above also indicate that Iran pursued design work on developing a prototype firing system to enable both air and ground detonation of the payload. Iran dismissed the information as an “animation game.” The Agency has worked with member state experts to determine that the most likely application of the designed air burst system would be for a nuclear system and that the alternative possible use (for chemical weapons-use) could be ruled out.

Taken together, this information and analysis does not prove that Iran had a nuclear weapon program. However, US and other foreign officials are convinced of Iran’s past illegal activities. Regardless, if a final comprehensive settlement is to be reached, Iran and the IAEA will have to find a politically acceptable way to resolve the outstanding matters under investigation.

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